IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Carlson et al.		
Assignee:	Maxtor Corporation		
Title:	DISK DRIVE WITH IMPROVED TECHNIQUES FOR DETECTING HEAD FLYING HEIGHT (AS AMENDED)		
Serial No.:	09/224,202	Filed:	December 30, 1998
Examiner:	Sniezek, A.	Group Art Unit:	2651
Atty. Docket No.:	3123-233-1		

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APPEAL BRIEF
(37 C.F.R. § 41.37)

Dear Sir:

This Appeal Brief is in furtherance of the Notice of Appeal filed concurrently herewith.

Please charge the $500 fee for filing this Appeal Brief to Deposit Account No. 13-0016/233-1 and charge any underpayment or credit any overpayment to this Account.

The index of subject matter is as follows:

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Maxtor Corporation.

II. RELATED APPEALS AND INTERFERENCES

A Decision on Appeal dated April 28, 2004 was issued for the application.

A Decision on Appeal dated May 27, 2004 was issued for U.S. Application Serial No. 09/843,631 filed April 27, 2001 (now U.S. Patent No. 6,894,854) which is a divisional of the application.

There are no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMED SUBJECT MATTER

A. Total Number of Claims in Application

Claims in the application are: 1-126

B. Status of All Claims

1.	Claims canceled:	1-46, 51, 52, 59, 60, 67-86, 89, 90, 99, 100, 107, 114, 116, 117 and 124
2.	Claims withdrawn:	NONE
3.	Claims pending:	47-50, 53-58, 61-66, 87, 88, 91-98, 101-106, 108-113, 115, 118-123, 125 and 126
4.	Claims allowed:	NONE
5.	Claims rejected:	47-50, 53-58, 61-66, 87, 88, 91-98, 101-106, 108-113, 115, 118-123, 125 and 126

C. Claims on Appeal

Claims on appeal are:	47-50, 53-58, 61-66, 87, 88, 91-98, 101-106, 108-113, 115, 118-123, 125 and 126

IV. STATUS OF AMENDMENTS

A Response that amends claim 87 has been filed after the outstanding Office Action dated June 15, 2005.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention is generally directed to a disk drive (disk drive 10, page 13, lines 16-17, Fig. 1) that includes a detection circuit (apparatus 50, page 20, lines 8-11, Fig. 5) that determines whether a head (head 18, page 13, lines 20-24, Fig. 1) is within an acceptable flying height range over a disk (disk 14, page 13, lines 20-24, Fig. 1) in response to first and second data patterns (AGC field 40 and C/D bursts 46, 48, page 18, lines 17-26, Fig. 4) stored on the disk (disk 14, page 13, lines 20-24, Fig. 1). The first data pattern (AGC field 40, page 18, lines 17-19, Fig. 4) has a first frequency, and the second data pattern (C/D bursts 46, 48, page 18, lines 22-26, Fig. 4) has a second frequency that is higher than the first frequency. The first and second data patterns (AGC field 40 and C/D bursts 46, 48, page 18, lines 17-26, Fig. 4) are located in separate non-overlapping circumferential portions of a track on the disk (Fig. 3).

The detection circuit (apparatus 50, page 20, lines 8-11, Fig. 5) determines whether the head (head 18, page 13, lines 20-24, Fig. 1) is within an acceptable flying height range while the head (head 18, page 13, lines 20-24, Fig. 1) is at a substantially constant flying height independently of flying height data obtained from the disk drive (disk drive 10, page 13, lines 16-17, Fig. 1) (1) at other than the substantially constant flying height (page 4, line 13 to page 5, line 2; page 16, line 21 to page 17, line 11; page 20, line 18 to page 21, line 22), and/or (2) at a predetermined flying height (page 4, line 13 to page 5, line 2; page 16, line 21 to page 17, line 11; page 20, line 18 to page 21, line 22).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The sole issue on appeal is whether claims 47-50, 53-58, 61-66, 87, 88, 91-98, 101-106, 108-113, 115, 118-123, 125 and 126 should be rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors at the time the application was filed had possession of the claimed invention.

VII. ARGUMENT

Claims 47-50, 53-58, 61-66, 87, 88, 91-98, 101-106, 108-113, 115, 118-123, 125 and 126 are rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors at the time the application was filed had possession of the claimed invention.

The Examiner asserts that "Independent claim 87 sets forth a detection circuit that determines if a head is within an acceptable flying height range in response to first and second data patterns while the head is at a substantially constant flying height." (Emphasis in original).

The Examiner also asserts that "Independent claim 97 has been amended to include a detection circuit that determines if a head is within an acceptable flying height range in response to first and second data patterns without moving the head to a substantially different flying height." (Emphasis in original).

The Examiner concludes that "the limitations directed to 'substantially constant flying height' and 'without moving the head to a substantially different flying height' are not supported by the specification as filed."

The specification illustrates this approach as follows:

> In one aspect of the present invention, a disk drive is provided that comprises a disk having a first data pattern with a first frequency and a second data pattern with a second, higher frequency on a first track. The disk drive also includes means for reading the first and second data patterns, using a head at a first vertical distance from the disk, to create first and second analog signal portions, respectively. In addition, the disk drive includes a determination unit for determining whether the first vertical distance of the head is within an acceptable range for performing a transfer of user data between the first track and an exterior environment using the first analog signal portion and the second analog signal portion, wherein the determination unit does not

require the movement of the head to a substantially different vertical distance to make the determination. (Page 4, line 13 to page 5, line 2) (Emphasis added).

In another aspect of the present invention, a disk drive is provided that includes a unit for determining whether the head is currently within an acceptable vertical distance from the disk surface for performing a transfer of user data between the predetermined track and the exterior environment before a transfer of user data is allowed to occur, wherein the determination does not include means for changing a current vertical distance between the head and the disk surface, and a transfer unit for performing the transfer of user data only when the head is determined to be within the acceptable vertical distance by the determination unit. (Page 6, line 24 to page 7, line 8) (Emphasis added)

To detect flying height variations in real time, the present invention relies upon variations in read signal resolution with flying height. Read signal resolution is a performance measurement that is related to the disk drive's ability to read information at different frequencies. In this regard, read signal resolution is generally calculated using the ratio of the magnitudes of two analog read signal portions having different frequencies. For example, to measure read signal resolution, a burst having a first frequency can be read from the disk surface to create a first analog signal portion and then a burst having a second, higher frequency can be read from the disk surface to create a second analog signal portion. The read signal resolution can then be calculated based upon the ratio of the magnitude of the second signal portion to the magnitude of the first signal portion. To maintain an accurate resolution measurement, both bursts have to be read at substantially the same head flying height. (Page 16, line 21 to page 17, line 11) (Emphasis added).

1. A disk drive, comprising:

a disk having a plurality of concentric tracks upon a surface of the disk for storing data, said disk including a first track having a first data pattern with a first frequency and a second data pattern with a second frequency that is higher than the first frequency;

a spin motor for rotating said disk at a substantially constant angular velocity;

a head for use in transferring data between a predetermined track of said disk and an exterior environment when said head is positioned above said predetermined track, wherein the ability of said head to transfer data between said predetermined track and said exterior environment is dependent upon the vertical distance between an air bearing surface of said head and said disk surface during said data transfer, wherein said vertical distance is measured along a normal line to said disk surface;

positioning means for radially positioning said head with respect to said disk in response to a control signal;

means for creating a first analog signal by reading said first data pattern using said head, while said air bearing surface of said head is at an unknown vertical distance from said disk surface;

means for creating a second analog signal by reading said second data pattern using said head, while said air bearing surface of said head is at substantially the same unknown vertical distance above said disk surface; and

means for determining whether said unknown vertical distance of said head is within an acceptable range for performing a transfer of user data between said first track and said exterior environment using said first analog signal and said second analog signal, wherein said means for determining does not require movement of said head to a substantially different vertical distance to make said determination. (Claim 1, pages 32-33) (Emphasis added).

25. The disk drive, as claimed in Claim 19, wherein:

said means for determining [while said head is located above said predetermined track, whether said head is currently within an acceptable vertical distance range from said disk surface] does not change the current vertical distance between said head and said disk surface to perform said determination. (Claim 25, page 40) (Emphasis added).

Thus, the specification makes abundantly clear that the limitations directed to "substantially constant flying height" and "without moving the head to a substantially different flying height" are described in such a way as to reasonably (in fact, readily) convey to one skilled in the art that the inventors at the time the application was filed had possession of the claimed invention.

Applicant respectfully submits that the specification conveys that the inventors contemplated all of the features in claim 87 and 97, including a detection circuit that determines whether the head is within an acceptable flying height range in response to first and second data patterns (1) while the head is at a substantially constant flying height (claim 87), and (2) without moving the head to a substantially different flying height (claim 97).

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on June 22, 2005.

D Sigmond — 6/22/05

David M. Sigmond
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Date of Signature

Respectfully submitted,

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VIII. CLAIMS APPENDIX

47. The disk drive of claim 87, wherein the first track includes an AGC field and a burst field, and one of the first and second data patterns is located in one of the AGC and burst fields.

48. The disk drive of claim 47, wherein the first data pattern is located in the AGC field.

49. The disk drive of claim 48, wherein the second data pattern is located in the AGC field.

50. The disk drive of claim 47, wherein the second data pattern is located in the burst field, and the burst field is used primarily during seek and settling operations.

53. The disk drive of claim 47, wherein the first data pattern is located in the AGC field and the second data pattern is located in the burst field.

54. The disk drive of claim 53, wherein the burst field is one of a C burst field and a D burst field.

55. The disk drive of claim 54, wherein the first track includes an A burst field and a B burst field between the first and second data patterns.

56. The disk drive of claim 55, wherein the A, B, C and D burst fields are located in a single servo region, the A and B burst fields are used primarily during track following operations, and the C and D burst fields are used primarily during seek and settling operations.

57. The disk drive of claim 87, wherein the detection circuit determines whether the head is within an acceptable flying height range in response to a peak count of a detection signal based on a data pattern that includes at least one of the first and second data patterns.

58. The disk drive of claim 57, wherein the data pattern is a constant frequency pattern.

61. The disk drive of claim 57, wherein the detection circuit includes a transition detector and a counter, and an output of the transition detector is coupled to an input of the counter.

62. The disk drive of claim 61, wherein the transition detector detects a transition in the detection signal only when the detection signal exceeds a predetermined threshold value.

63. The disk drive of claim 62, wherein the counter counts the number of transitions in the detection signal detected by the transition detector and provides the peak count.

64. The disk drive of claim 63, wherein the detection circuit includes a memory, and the memory provides a calibration value corresponding to a data storage location on the track that is accessed during one of a read and write operation while the data pattern is read to provide the detection signal.

65. The disk drive of claim 64, wherein the detection circuit determines whether the head is within an acceptable flying height range in response to the peak count and the calibration value.

66. The disk drive of claim 65, wherein the detection circuit postpones the operation if the detection circuit determines that the head is not within an acceptable flying height range.

87. A disk drive, comprising:

a disk having a plurality of concentric tracks for storing data, the tracks including a first track having a first data pattern with a first frequency and a second data pattern with a second frequency that is higher than the first frequency, wherein the first and second data patterns are located in separate non-overlapping circumferential portions of the first track;

a head for reading data from and writing data to the disk; and

a detection circuit that determines whether the head is within an acceptable flying height range in response to the first and second data patterns while the head is at a substantially constant flying height.

88. The disk drive of claim 87, wherein the second data pattern is a constant frequency pattern.

91. The disk drive of claim 87, wherein the second data pattern is located in an AGC field.

92. The disk drive of claim 87, wherein the second data pattern is located in a servo burst field.

93. The disk drive of claim 87, wherein the detection circuit determines whether the head is within an acceptable flying height range while the head is at a non-predetermined flying height.

94. The disk drive of claim 87, wherein the detection circuit includes a transition detector, a counter, and a memory, an output of the transition detector is coupled to an input of the counter, and outputs of the counter and the memory are coupled to an output of the detection circuit.

95. The disk drive of claim 94, wherein the transition detector detects a transition in a detection signal based on the second data pattern only when the detection signal exceeds a predetermined threshold value, the counter counts the number of transitions in the detection signal detected by the transition detector and provides a peak count, the memory provides a calibration value corresponding to a data storage location on the track that is accessed during one of a read and write operation while the first and second data patterns are read, and the detection circuit determines whether the head is within an acceptable flying height range in response to the peak count and the calibration value.

96. The disk drive of claim 95, wherein the detection circuit postpones the operation if the detection circuit determines that the head is not within an acceptable flying height range.

97. A disk drive, comprising:

a disk having a plurality of concentric tracks for storing data, the tracks including a first track having a first data pattern with a first frequency and a second data pattern with a second frequency that is higher than the first frequency, wherein the first and second data patterns are located in separate non-overlapping circumferential portions of the first track;

a head for reading data from and writing data to the disk; and

a detection circuit that determines whether the head is within an acceptable flying height range in response to the first and second data patterns without moving the head to a substantially different flying height.

98. The disk drive of claim 97, wherein the second data pattern is a constant frequency pattern.

101. The disk drive of claim 97, wherein the second data pattern is located in an AGC field.

102. The disk drive of claim 97, wherein the second data pattern is located in a servo burst field.

103. The disk drive of claim 97, wherein the detection circuit determines whether the head is within an acceptable flying height range while the head is at a non-predetermined flying height.

104. The disk drive of claim 97, wherein the detection circuit includes a transition detector, a counter, and a memory, an output of the transition detector is coupled to an input of the counter, and outputs of the counter and the memory are coupled to an output of the detection circuit.

105. The disk drive of claim 104, wherein the transition detector detects a transition in a detection signal based on the second data pattern only when the detection signal exceeds a predetermined threshold value, the counter counts the number of transitions in the detection signal detected by the transition detector and provides a peak count, the memory provides a calibration value corresponding to a data storage location on the track that is accessed during one of a read and write operation while the first and second data patterns are read, and the detection circuit determines whether the head is within an acceptable flying height range in response to the peak count and the calibration value.

106. The disk drive of claim 105, wherein the detection circuit postpones the operation if the detection circuit determines that the head is not within an acceptable flying height range.

108. The disk drive of claim 87, wherein the first and second data patterns are circumferentially spaced from one another.

109. The disk drive of claim 87, wherein the first and second data patterns each intersect a centerline of the first track.

110. The disk drive of claim 87, wherein the first data pattern is circumferentially adjacent to a first user data field on the first track.

111. The disk drive of claim 110, wherein the second data pattern is circumferentially adjacent to a second user data field on the first track.

112. The disk drive of claim 87, wherein the first and second data patterns are circumferentially adjacent to and separated by a region of the first track that is devoid of a user data field.

113. The disk drive of claim 112, wherein the region of the first track contains two servo burst fields between the first and second data patterns.

115. The disk drive of claim 87, wherein only one of the first and second data patterns provides servo positioning information.

118. The disk drive of claim 97, wherein the first and second data patterns are circumferentially spaced from one another.

119. The disk drive of claim 97, wherein the first and second data patterns each intersect a centerline of the first track.

120. The disk drive of claim 97, wherein the first data pattern is circumferentially adjacent to a first user data field on the first track.

121. The disk drive of claim 120, wherein the second data pattern is circumferentially adjacent to a second user data field on the first track.

122. The disk drive of claim 121, wherein the first and second data patterns are circumferentially adjacent to and separated by a region of the first track that is devoid of a user data field.

123. The disk drive of claim 122, wherein the region of the first track contains two servo burst fields between the first and second data patterns.

125. The disk drive of claim 97, wherein only one of the first and second data patterns provides servo positioning information.

126. The disk drive of claim 97, wherein both of the first and second data patterns provide servo positioning information.